PENDING CLAIMS

This listing of claims will replace all prior versions, and listing of claims in the application:

Claim 1 (Previously presented): A method of simulating a circuit, comprising:

representing the circuit as a hierarchically arranged set of branches, including a root branch and a plurality of other branches logically organized in a graph; the hierarchically arranged set of branches including a first branch that includes one or more driver leaf circuits and a second branch that includes one or more receiver leaf circuits; wherein the first branch and second branch are interconnected in the graph through a third branch at a higher hierarchical level in the graph than the first and second branches; and

simulating operation of the one or more driver leaf circuits and the one or more receiver leaf circuits, together by using a port connectivity interface, without simulating operation of the third branch to determine a first set of changes in signal conditions shared by the one or more driver leaf circuits and the one or more receiver leaf circuits, wherein the port connectivity interface facilitates communications of dynamic information between the one or more driver leaf circuits and the one or more receiver leaf circuits, and wherein dynamic hierarchical data structures of the one or more driver leaf circuits and the one or more receiver leaf circuits are maintained.

Claim 2 (Previously presented): The method of claim 1, wherein the simulating includes storing the first set of changes in signal conditions in a the port connectivity interface and conveying the first set of changes in signal conditions from the one or more driver leaf circuits to the one or more receiver leaf circuits via the port connectivity interface.

Claim 3 (Previously presented): The method of claim 1, wherein the port connectivity interface is generated dynamically upon detecting a set of triggering conditions during simulation.

Claim 4 (Previously presented): The method of claim 1, wherein the port connectivity interface comprises:

a set of input vectors for referencing to a set of input ports of the one or more receiver leaf circuits;

a set of output vectors for referencing to a set of output ports of the one or more driver leaf circuits;

a set of load vectors for referencing to a set of loads of the one or more driver leaf circuits; and

an array of storage elements for storing information associating the set of loads to the set of input ports.

Claim 5 (Previously presented): The method of claim 2, wherein conveying the first set of changes in signal conditions comprises:

monitoring the first set of changes in signal conditions at each output port of the one or more driver leaf circuits; and

communicating the first set of signal changes from the output ports of the one or more driver leaf circuits to the input ports of the one or more receiver leaf circuits through the port connectivity interface in response to the first set of changes in signal conditions exceed a first set of predefined tolerance parameters.

Claim 6 (Original): The method of claim 5, wherein the first set of changes of signal conditions at each output port of the one or more driver leaf circuits comprises:

a voltage of the output port;

a rate of change of voltage of the output port; and

a time stamp at which the changes of signal conditions occur.

Claim 7 (Original): The method of claim 5, wherein the step of communicating comprises:

identifying input port references coupled to each output port of the one or more driver leaf circuits in accordance with the port connectivity interface;

identifying each input port of the one or more receiver leaf circuits that correspond to the input port references; and

transmitting the first set of changes in signal conditions from the one or more driver leaf circuits to the one or more receiver leaf circuits.

Claim 8 (Original): The method of claim 2 further comprising:

storing a second set of changes in signal conditions in the port connectivity interface and conveying the second set of changes in signal conditions from the one or more receiver leaf circuits to the one or more driver leaf circuits via the port connectivity interface.

Claim 9 (Previously presented): The method of claim 8, wherein conveying the second set of changes in signal conditions comprises:

monitoring the second set of signal changes at each input port of the one or more receiver leaf circuits; and

communicating the second set of signal changes from input ports of the one or more receiver leaf circuits to output ports of the one or more driver leaf circuits via the port connectivity interface in response to the second set of changes in signal conditions exceed a second set of predefined tolerance parameters.

Claim 10 (Original): The method of claim 9, wherein the second set of signal changes at each input port of the receiver leaf circuit comprises:

a current of the input port;

a capacitance of the input port; and

a time stamp at which the second set of changes of signal conditions occur.

Claim 11 (Original): The method of claim 9, wherein the step of communicating comprises:

identifying load references coupled to each input port of the one or more receiver leaf circuits in accordance with the port connectivity interface;

identifying each output port of the one or more driver leaf circuits corresponding to the identified load references; and

transmitting the second set of signal changes from the one or more receiver leaf circuits to the one or more driver leaf circuit via the port connectivity interface.

Claim 12 (Previously presented): A system for simulating a circuit, comprising:

at least one processing unit for executing computer programs;

a user interface for performing at least one of the functions selected from the group consisting of entering a netlist representation of the circuit, viewing representations of the circuit on a display, and observing simulation results of the circuit;

a memory for storing a static database and a dynamic database of the circuit;

means for representing the circuit as a hierarchically arranged set of branches including a root branch and a plurality of other branches logically organized in a graph; the hierarchically arranged set of branches including a first branch that includes one or more driver leaf circuits and a second branch that includes one or more receiver leaf circuits; wherein the first branch and second branch are interconnected in the graph through a third branch at a higher hierarchical level in the graph than the first and second branches; and

means for simulating operation of the one or more driver leaf circuits and the one or more receiver leaf circuits, together by using a port connectivity interface, without simulating operation of the third branch to determine a first set of changes in signal conditions shared by the one or more driver leaf circuits and the one or more receiver leaf circuits, wherein the port connectivity interface facilitates communications of dynamic information between the one or more driver leaf circuits and the one or more receiver leaf circuits, and wherein dynamic hierarchical data structures of the one or more driver leaf circuits and the one or more receiver leaf circuits are maintained.

Claim 13 (Previously presented): The system of claim 12, wherein the means for simulating includes means for storing the first set of changes in signal conditions in the port connectivity interface and means for conveying the first set of changes in signal conditions from the one or more driver leaf circuits to the one or more receiver leaf circuits via the port connectivity interface.

Claim 14 (Previously presented): The system of claim 12, wherein the port connectivity interface is generated dynamically upon detecting a set of triggering conditions during simulation.

Claim 15 (Previously presented): The system of claim 12, wherein the port connectivity interface comprises:

a set of input vectors for referencing to a set of input ports of the one or more receiver leaf circuits;

a set of output vectors for referencing to a set of output ports of the one or more driver leaf circuits;

a set of load vectors for referencing to a set of loads of the one or more driver leaf circuits; and

an array of storage elements for storing information associating the set of loads to the set of input ports.

Claim 16 (Previously presented): The system of claim 13, wherein the means for conveying the first set of changes in signal conditions comprises:

means for monitoring the first set of changes in signal conditions at each output port of the one or more driver leaf circuits; and

means for communicating the first set of signal changes from the output ports of the one or more driver leaf circuits to the input ports of the one or more receiver leaf circuits through the port connectivity interface in response to the first set of changes in signal conditions exceed a first set of predefined tolerance parameters.

Claim 17 (Original): The system of claim 16, wherein the first set of changes of signal conditions at each output port of the one or more driver leaf circuits comprises:

a voltage of the output port;

a rate of change of voltage of the output port; and

a time stamp at which the changes of signal conditions occur.

Claim 18 (Original): The system of claim 16, wherein the means for communicating comprises:

means for identifying input port references coupled to each output port of the one or more driver leaf circuits in accordance with the port connectivity interface;

means for identifying each input port of the one or more receiver leaf circuits that correspond to the input port references; and

means for transmitting the first set of changes in signal conditions from the one or more driver leaf circuits to the one or more receiver leaf circuits.

Claim 19 (Original): The system of claim 13 further comprising:

means for storing a second set of changes in signal conditions in the port connectivity interface and means for conveying the second set of changes in signal conditions from the one or more receiver leaf circuits to the one or more driver leaf circuits via the port connectivity interface.

Claim 20 (Previously presented): The system of claim 19, wherein the means for conveying the second set of changes in signal conditions comprises:

means for monitoring the second set of signal changes at each input port of the one or more receiver leaf circuits; and

means for communicating the second set of signal changes from input ports of the one or more receiver leaf circuits to output ports of the one or more driver leaf circuits via the port connectivity interface in response to the second set of changes in signal conditions exceed a second set of predefined tolerance parameters.

Claim 21 (Original): The system of claim 20, wherein the second set of signal changes at each input port of the receiver leaf circuit comprises:

a current of the input port;

a capacitance of the input port; and

a time stamp at which the second set of changes of signal conditions occur.

Claim 22 (Original): The system of claim 20, wherein the means for communicating comprises:

means for identifying load references coupled to each input port of the one or more receiver leaf circuits in accordance with the port connectivity interface;

means for identifying each output port of the one or more driver leaf circuits corresponding to the identified load references; and

means for transmitting the second set of signal changes from the one or more receiver leaf circuits to the one or more driver leaf circuit via the port connectivity interface.

Claim 23 (Previously presented): A computer program product, comprising a medium storing computer programs for execution by one or more computer systems, the computer program product comprising:

a simulator module for simulating a circuit, wherein the simulator module is used in conjunction with at least a processing unit, a user interface and a memory, and the simulator module includes one or more computer programs containing instructions for:

representing the circuit as a hierarchically arranged set of branches, including a root branch and a plurality of other branches logically organized in a graph; the hierarchically arranged set of branches including a first branch that includes one or more driver leaf circuits and a second branch that includes one or more receiver leaf circuits; wherein the first branch and second branch are interconnected in the graph through a third branch at a higher hierarchical level in the graph than the first and second branches; and

simulating operation of the one or more driver leaf circuits and the one or more receiver leaf circuits, together by using a port connectivity interface, without simulating operation of the third branch to determine a first set of changes in signal conditions shared by the one or more driver leaf circuits and the one or more receiver leaf circuits, wherein the port connectivity interface facilitates communications of dynamic information between the one or more driver leaf circuits and the one or more receiver leaf circuits, and wherein dynamic hierarchical data structures of the one or more driver leaf circuits and the one or more receiver leaf circuits are maintained.

Claim 24 (Previously presented): The computer program product of claim 23, wherein the instructions for simulating includes instructions for storing the first set of changes in signal conditions in the the port connectivity interface and instructions for conveying the first set of changes in signal conditions from the one or more driver leaf circuits to the one or more receiver leaf circuits via the port connectivity interface.

Claim 25 (Previously presented): The computer program product of claim 23, wherein the port connectivity interface is generated dynamically upon detecting a set of triggering conditions during simulation.

Claim 26 (Previously presented): A computer program product of claim 23, wherein the port connectivity interface comprises:

a set of input vectors for referencing to a set of input ports of the one or more receiver leaf circuits;

a set of output vectors for referencing to a set of output ports of the one or more driver leaf circuits;

a set of load vectors for referencing to a set of loads of the one or more driver leaf circuits; and

an array of storage elements for storing information associating the set of loads to the set of input ports.

Claim 27 (Previously presented): The computer program product of claim 24, wherein the instructions for conveying the first set of changes in signal conditions comprises instructions for:

monitoring the first set of changes in signal conditions at each output port of the one or more driver leaf circuits; and

communicating the first set of signal changes from the output ports of the one or more driver leaf circuits to the input ports of the one or more receiver leaf circuits through the port connectivity interface in response to the first set of changes in signal conditions exceed a first set of predefined tolerance parameters.

Claim 28 (Original): The computer program product of claim 27, wherein the first set of changes of signal conditions at each output port of the one or more driver leaf circuits comprises:

a voltage of the output port;

a rate of change of voltage of the output port; and

a time stamp at which the changes of signal conditions occur.

Claim 29 (Original): The computer program product of claim 27, wherein the instructions for communicating comprises instructions for:

identifying input port references coupled to each output port of the one or more driver leaf circuits in accordance with the port connectivity interface;

identifying each input port of the one or more receiver leaf circuits that correspond to the input port references; and

transmitting the first set of changes in signal conditions from the one or more driver leaf circuits to the one or more receiver leaf circuits.

Claim 30 (Original): The computer program product of claim 24 further comprising instructions for:

storing a second set of changes in signal conditions in the port connectivity interface and conveying the second set of changes in signal conditions from the one or more receiver leaf circuits to the one or more driver leaf circuits via the port connectivity interface.

Claim 31 (Previously presented): The computer program product of claim 30, wherein the instructions for conveying the second set of changes in signal conditions comprises instructions for:

monitoring the second set of signal changes at each input port of the one or more receiver leaf circuits; and

communicating the second set of signal changes from input ports of the one or more receiver leaf circuits to output ports of the one or more driver leaf circuits via the port connectivity interface in response to the second set of changes in signal conditions exceed a second set of predefined tolerance parameters.

Claim 32 (Original): The computer program product of claim 31, wherein the second set of signal changes at each input port of the receiver leaf circuit comprises:

a current of the input port;

a capacitance of the input port; and

a time stamp at which the second set of changes of signal conditions occur.

Claim 33 (Original): The computer program product of claim 31, wherein the instructions for communicating comprises instructions for:

identifying load references coupled to each input port of the one or more receiver leaf circuits in accordance with the port connectivity interface;

identifying each output port of the one or more driver leaf circuits corresponding to the identified load references; and

transmitting the second set of signal changes from the one or more receiver leaf circuits to the one or more driver leaf circuit via the port connectivity interface.

Claim 34 (Previously presented): The method of claim 1, wherein communications of dynamic information between the one or more driver leaf circuits and the one or more receiver leaf circuits comprise:

a forward communication of changes in signal conditions from the one or more driver leaf circuits to the one or more receiver leaf circuits using the port connectivity interface without traversing the dynamic hierarchical data structures of the one or more driver leaf circuits and the one or more receiver leaf circuits.

Claim 35 (Previously presented): The method of claim 1, wherein communications of dynamic information between the one or more driver leaf circuits and the one or more receiver leaf circuits further comprise:

a reverse communication of changes in signal conditions from the one or more receiver leaf circuits to the one or more driver leaf circuits using the port connectivity interface without traversing the dynamic hierarchical data structures of the one or more receiver leaf circuits and the one or more driver leaf circuits.